

# The Relationship Between Returns And Unexpected Earnings: A Comparison Of Australia And The United States

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## Abstract

*This paper examines a relatively short-term market reaction to unexpected earnings in Australia and the United States (U.S.). Using data from 1987 to 1998, we test the existence of a short-term market reaction to the release of earnings in both countries. Because accounting standards, stock market characteristics and culture are similar in the two countries, we expect similar market responses to earnings releases. The results indicate that both the Australian and the U.S. markets react relatively quickly to earnings releases. We also examine the incremental explanatory power of analysts' forecast errors over the change in earnings per share. Both the change in earnings per share and analysts' forecast errors are expected to provide information to the market. The results from this hypothesis conform to expectations, as both pieces of information are associated with market returns in the two countries. Finally, we utilize t-tests to examine if the coefficients between Australia and the U.S. are different. If so, differences in accounting, stock markets, and/or culture alter how information is processed between the two countries. This hypothesis is not supported. In sum, the U.S. and Australian stock markets react similarly to the release of unexpected earnings.*

## 1.0 Introduction

In recent years, the global economy has become a reality. Thus, understanding differences in international accounting practices and their impact on capital markets is important. International accounting research has examined how differences in accounting practices impact valuation.<sup>1</sup> This paper examines a relatively short-term market reaction to unexpected earnings defined by both change in earnings and analysts' forecast errors in Australia and the United States (U.S.). Differences in accounting standards, stock market characteristics and culture may cause differences in market responses to earnings releases. We first explore key similarities and differences between the accounting standards of the two countries. In general, the accounting standards are very similar. We then develop hypotheses to examine whether accounting differences, in conjunction with culture and market characteristics, lead to varying market reactions to earnings announcements and market participants' expectations of current year's earnings. Because of similarities in accounting standards and market development, we expect investors to react similarly to the release of unexpected earnings.

An extensive amount of research examines the earnings-returns relationship. Early research attempted to identify a relationship between earnings and returns in a single country. Specifically, this research attempts to identify price changes around the release of financial statements and/or earnings information. Ball and Brown (1968) were the first to confirm the relationship between returns and earnings using data from the U.S. Similar analysis has been conducted in several foreign countries, with results typically consistent with those in the U.S.<sup>2</sup> Recent international accounting research attempts to identify cross-country differences in the value relevance of earnings announcements.<sup>3</sup> Though value relevance is examined using various methodologies, a consistent component of these studies is a \_\_\_\_\_

*Readers with comments or questions are encouraged to contact the authors via email.*

comparison of the estimated coefficients and explanatory power of the association between earnings and returns. The results generally show significant differences in the estimated coefficients and explanatory power of the earnings-returns re-

relationship across countries. Myring (2002) extends those studies by examining the impact of EPS and analysts' forecast errors on returns in various accounting regimes. His research shows that more developed countries use information from prior earnings as well as analysts' forecasts whereas less developed countries tend to rely only on prior earnings.

Using data from 1987 to 1998, we test the existence of a short-term market reaction to the release of earnings in both countries. The results from this hypothesis indicate that both the Australian and the U.S. markets react relatively quickly to earnings releases. Further, when changes in analysts' forecasts are used as an indication of updated earnings expectations, both markets react to unexpected earnings. Thus, it appears that investors in both countries react to the release of unexpected earnings in a similar manner.

The second hypothesis provides more insight into the information utilized by the markets by examining the incremental explanatory power of analysts' forecast errors over the change in earnings per share. As both Australia and the U.S. have fairly well developed stock markets, investors are likely to formulate earnings expectations based on a wide range of financial and non-financial information, including analysts' forecasts. Thus, we posit that both the change in earnings per share and analysts' forecast errors will provide information to the market. The results from this hypothesis conform to expectations. In the U.S. and Australia, both pieces of information are associated with market returns suggesting that the analysts provide information incremental to that provided in earnings releases.

Finally, we utilize t-tests to examine whether the coefficients between Australia and the U.S. are different. If the coefficients are significantly different, investors react differently to the release of unexpected earnings. This would suggest that differences in accounting, stock markets, and/or culture alter how information is processed between the two countries. The results show that the coefficients are not significantly different. This result is not surprising as both countries have highly developed accounting standards and both markets are mature.

## **2.0 U.S. VS. Australian GAAP**

The U.S. and Australia both have very sophisticated accounting principles. In fact, many pronouncements are virtually identical. For example, both countries have very similar rules for the treatment of inventory. In particular, both the U.S. and Australia require inventories to be reported at the lower of cost or market although replacement cost is defined slightly differently (*Accounting Research Bulletin (ARB) No. 43* and *Australian Accounting Standards Board (AASB) 1019*). The only major difference between the two is that the U.S. allows companies to utilize the last-in, first-out inventory cost flow assumption while Australia does not.

Investments in both the U.S. and Australia are accounted for depending upon the type of securities involved and the investment relationship between the investor and investee. In both countries, debt or equity securities that are actively traded are reported at fair value with unrealized gains and losses included in earnings (*Statement of Financial Accounting Standards (SFAS) 115* and *AASB 1033*). Investments in debt securities that the investor has the intent and ability to hold to maturity are reported at amortized cost. Further, both countries also use the equity method for securities investments in which the investor can significantly influence the operating and financing policies of the investee (*Accounting Principles Board (APB) No. 18* and *AASB 1016*).<sup>4</sup> In both countries, equity investments greater than 50% require the parent company to report consolidated financial statements.

U.S. GAAP and Australian GAAP also had similar reporting requirements for purchased goodwill through June 2001 (*APB No. 17* and *AASB 1013*).<sup>5</sup> In particular, in both countries, purchased goodwill was calculated as the excess of the purchase consideration over the fair value of the identifiable net assets acquired. Further, both countries required purchased goodwill to be amortized on a straight-line basis over the periods during which benefits were expected. In Australia, goodwill is amortized over a maximum of 20 years while the U.S. maximum was 40 years. Finally, in both countries, the value of purchased goodwill was written down if there was a significant impairment of value.

Both U.S. and Australian GAAP follow the balance sheet approach for accounting for deferred taxes (*SFAS 109* and *AASB 1020*). The objective of the deferred tax requirements in both countries is to recognize a tax asset or liability for the tax consequences of amounts that will become deductible or taxable in future years as a result of transactions or

events that have already occurred. In both Australia and the U.S., tax assets must be reduced by a valuation allowance if some, or all, of the asset will not be realized.

Despite the numerous similarities in reporting requirements, there are a few significant differences. Perhaps the most significant reporting difference pertains to research and development costs. Under Australian GAAP (*AASB 1011*), research and development costs that provide future economic benefits are capitalized. Capitalized research and development is then amortized over the periods in which it provides benefits. Meanwhile, in the U.S., *SFAS 2* requires that all research and development costs must be expensed when incurred. This difference can have a substantial impact on the financial statements of U.S. and Australian companies. For example, in 2001 Eli Lilly, a U.S. pharmaceutical company, spent \$2.2 billion on research and development, almost equaling their net income of \$2.8 billion.

There are also substantial differences in the way property, plant and equipment is accounted for between the two countries. The major difference involves asset revaluations. In particular, both countries record an expense for asset impairments on the income statement. However, in the U.S., a long-term asset is never recorded at an amount in excess of its historical costs. In contrast, according to *AASB 1041* companies may elect to re-value classes of non-current assets at fair value (i.e. their value can be increased).<sup>6</sup> When a class of assets has a rise in value, the increase is reported in an equity valuation account. A decrement in value is reported as an expense, except to the extent that it offsets a previous value increment. Thus, increments in value do not directly impact earnings but declines in value do. Thus, this difference in standard is likely to have only a small impact on reported earnings between the two countries.

### **3.0 Hypotheses Development**

We develop three hypotheses to explore the market reactions to earnings, analysts' forecasts, and the differences between the Australian and U.S. reactions. The first hypothesis examines the existence of a short-term market reaction to the release of earnings. Previous research has documented a market reaction to the release of earnings information in the U.S. and other countries. However, there are several potential reasons for lack of a relatively short-term reaction to an earnings announcement. First, accounting information may be of low quality and, thus, viewed as value irrelevant. In addition, firm-specific characteristics and macro economic conditions have been shown to cause variation in the market reaction to the release of earnings in the U.S. and thus may cause international variation in the market reaction to the release of earnings. Finally, investors may not possess equal access to financial and non-financial information and may process available information with varying degrees of efficiency. An extreme form of any of these conditions (or a combination of conditions) may cause the lack of a market response to earnings announcements.

Conditions also may exist that cause the market not to react to earnings announcements in the short-term even though a reaction may exist in the long-term. Cultural differences may result in differences in investors' behavior. For example, investors in some countries may possess a long-term perspective in investing decisions and react only to long-term changes in profitability. In this case, there would be little short-term market reaction to an earnings announcement but a long-term market reaction may exist. Because of the quality of accounting standards and degree of market sophistication, we expect markets to react to the release of unexpected earnings in both countries:

H1: A relatively short-term market reaction to the release of earnings will exist in Australia and the U.S.

The second hypothesis provides a more detailed exploration of the information used by investors when forming earnings expectations. Previous research in the U.S. has primarily used two proxies for market participants' earnings expectations: prior year's earnings and mean analysts' forecasts. Using prior year's earnings as a proxy for earnings expectations implies that market participants base their expectation of current year's earnings on the prior year's earnings alone. The use of analysts' forecasts as proxies for earnings expectations assumes that market participants have access to analysts' forecasts of earnings and incorporate such information into earnings expectations or, alternatively, have access to the same information as analysts and process it in a similar manner.

Assuming that the market reacts to the release of information, three potential outcomes are possible: (1) the market may react to earnings information as defined by a change in EPS, (2) the market may react to earnings information as defined by analysts' forecast errors, or (3) the market may react to earnings information as defined by both the change

in EPS and analysts' forecast errors. A significant reaction to change in EPS alone indicates that accounting information is value relevant and that investors base their expectations of current year's earnings on past earnings rather than analysts' forecasts.

A market reaction to unexpected earnings as defined by analysts' forecast errors but not changes in EPS is likely to result if investor expectations are approximated by analysts' forecasts. This may occur in highly developed markets where investors are well informed and new information is reflected in stock prices quickly. In such cases, few investors view the prior year's actual earnings as the sole criterion for developing expectations of the current year's earnings. A market reaction to both measures of unexpected earnings is likely to occur when market expectations of current year's earnings are based on both the prior year's earnings and analysts' forecasts. Thus, this situation can occur in developed markets where forecast information is readily available, but less efficiently reflected in stock prices. Because investors in the U.S. and Australia are sophisticated and accounting standards are well developed, we expect investors to use a combination of financial and non-financial information (including analysts' forecasts) to form earnings expectations. In addition, we expect investors to react when earnings deviate from expectations. This leads to the second hypothesis:

H2: The information content of analysts' forecast errors will provide incremental information to the change in EPS in both the U.S. and Australian markets.

Market reactions are expected to vary across countries for many reasons. Differences in accounting standards may result in differences in the quality of earnings, which has been shown to affect the market reaction to the release of earnings in the U.S. (see, for example, Bandyopadhyay 1994). Also, cultural differences may be reflected in differences in investment strategies and stock market development, regulation and efficiency. Finally, companies in different countries may experience different macro economic conditions, causing variations in the earnings-returns relationship.<sup>7</sup> Because of the similarities between the two countries, we expect little difference in the market reaction to earnings. Thus, the third hypothesis is:

H3: The magnitude of the U.S. and Australian market reactions to EPS and analysts' forecast errors will not be different.

#### 4.0 Data And Descriptive Statistics

The preliminary sample used in this study is selected based on data available from the Institutional Brokers Estimation System (I/B/E/S) database. Table 1, Panel A, reports that 60,792 observations were available for the two countries between 1987 and 1998. Of those observations, 20,784 had monthly stock prices and dividends on Compustat Global Vantage (GV) database. Thus, the final sample used in this analysis consists of a total of 20,784 firm-years (3,072 companies) from the two countries. To reduce the effect of extreme observations, each variable used in analysis is winsorized at five percent.

Descriptive statistics are presented in Table 2. These statistics are based on the winsorized sample. Mean and median excess returns are positive for both the U.S. and Australia. The median CEPS is positive for both the U.S. and Australia while the mean for Australia is 0. Mean analysts' forecast errors are negative in both countries indicating that analysts, on average, are overly optimistic in forecasting earnings.

Excess returns are calculated using the market-adjusted model for the month of the earnings release.<sup>8</sup> The market return is the return on an equally weighted portfolio of stocks in the market. This methodology implicitly assumes that all firms' betas are constant and equal to one.<sup>9</sup>

TABLE 1: Sample Selection Procedure Partitioned by Countries

Panel A: Firm-Years

Country	Total Firm-Year Observations Available from I/B/E/S	Less: Firm Years Not Available on Global Vantage	Total Firm-Years Observations in Final Sample
U.S.	57,521	(38,076)	19,445
Australia	<u>3,271</u>	<u>(1,932)</u>	<u>1,339</u>
Total	60,792	(40,008)	20,784

**Panel B: Companies**

Country	Total Companies I/B/E/S	Less: Companies on Global Vantage	Total Companies in Final Sample
U.S.	13,702	(10,840)	2,862
Australia	<u>940</u>	<u>(730)</u>	<u>210</u>
Total	14,642	(11,570)	3,072

**TABLE 2: Pooled Cross-Sectional Descriptive Statistics for Dependent and Independent Variables Partitioned by Countries, 1987-1998**

Country	Mean	Median	St. Dev.	1 <sup>st</sup> Quartile	3 <sup>rd</sup> Quartile
<b>U.S.</b> (n=19,445)					
Excess Return	0.013	0.006	0.091	-0.049	0.068
CEPS	0.002	0.006	0.039	-0.008	0.017
AFE	-0.003	0.000	0.013	-0.003	0.002
<b>Australia</b> (n=1,339)					
Excess Return	0.010	0.010	0.066	-0.034	0.054
CEPS	0.000	0.004	0.033	-0.013	0.015
AFE	-0.002	0.000	0.008	-0.004	0.002

Excess Returns = One-month excess returns during the month of earnings release.

CEPS = Change in annual earnings per share between time  $\tau$  and  $\tau-1$  deflated by price.

AFE = Actual I/B/E/S annual earnings per share less I/B/E/S forecast annual EPS deflated by price.

**5.0 Tests Of Hypotheses**

The first hypothesis examines the existence of a market response to the release of earnings information. H1 is tested using two models. In the first model, one-month excess returns are regressed on the change in EPS as shown below:

$$ER_{j,t} = \alpha_0 + \alpha_1 CEPS_{j\tau} + e_{j,t} \quad (1)$$

where  $ER_{j,t}$  = excess returns for firm  $j$  and time  $t$

$CEPS_{j\tau}$  = change in EPS for firm  $j$  and year  $\tau$  deflated by price, and

$e_{j\tau}$  = regression error term for company  $j$  and year  $\tau$ .

Alternatively, H1 is tested using a similar model in which excess returns are regressed on analysts' forecast errors. This regression is shown in the following equation:

$$ER_{j,t} = \beta_0 + \beta_1 AFE_{j\tau} + \mu_{j\tau} \quad (2)$$

where  $AFE_{jt}$  = analysts' forecast error for company  $j$  and year  $\tau$  deflated by price, and

$\mu_{jt}$  = regression error term for company  $j$  and year  $\tau$ .

$AFE_{jt}$  is calculated using the mean consensus forecast of annual earnings. Specifically, the most recent consensus forecast prior to an earnings announcement release date is used. H1 is tested by estimating equation (1) and (2) for Australia and the U.S. If either  $\alpha_1$  or  $\beta_1$  is significant, there is a market reaction to the release of accounting earnings and H1 is supported. Support of H1 indicates that accounting information is value relevant to investors and that there is a reaction to the announcement of earnings that does not conform with expectations.

The results of the two initial regressions testing H1 are presented in Table 3.<sup>10</sup> The CEPS regressions reveal a positive and significant relationship between CEPS and excess returns in both countries. The coefficient on CEPS for the U.S. is 0.233 and is significant at the 0.01 level while the coefficient on CEPS for Australia is 0.157 and is significant at the 0.05 level. Thus, there is a market reaction to the release of unexpected accounting earnings defined by CEPS. These results support H1 and indicate that investors in both countries view accounting information as value relevant. In essence, when expected accounting earnings and reported earnings do not conform, investors react. It is interesting to note that the adjusted  $R^2$  for the U.S. is nearly twice as large as the Australian adjusted  $R^2$ . This suggests that perhaps accounting information is relied on more heavily in the U.S. than in Australia.

H1 is also tested using an alternate measure of unexpected earnings, AFE. The results of the AFE regression also reveal a relationship between unexpected earnings and returns in the U.S. and Australia. The coefficients for the AFE variable are positive and significant in both countries. The coefficients on these variables are higher than the CEPS regression coefficients, ranging from 0.598 in the U.S. to 0.627 in Australia. This indicates that investors in both countries incorporate analysts' forecasts into earnings expectations. In addition, when actual earnings do not conform to expectations, investors react. This provides additional evidence that investors view accounting information as value relevant in both countries. In sum, the results of these two regressions reveal a significant reaction to the release of unexpected earnings and lead to the support of H1 in both countries. The similarity in market reaction to the release of earnings is likely the result of the similarity in their accounting standards and market development.

H2 examines the incremental explanatory power of AFE as a proxy for market participants' earnings expectations over CEPS. This hypothesis examines the nature of the information obtained by investors in formation of earnings expectations, and/or the efficiency and effectiveness with which it is processed. Tests of incremental information content are used to determine whether analysts' forecast errors are associated with excess returns after the effect of change in EPS has been removed. This is accomplished through a regression of excess returns on the two measures of unexpected earnings: the change in annual EPS and analysts' forecast errors as shown in the following equation:

$$ER_{jt} = \varphi_0 + \varphi_1 AFE_{jt} + \varphi_2 CEPS_{jt} + \omega_{jt}. \quad (3)$$

where  $\omega_{jt}$  = regression error term for company  $j$  at year  $\tau$ .

H2, involving the incremental information content of analysts' forecast errors, is testing by estimating equation (3) using data pooled by each country. Analysts' forecast errors possess incremental information content over the change in EPS if  $\varphi_1$  is significant. More specifically, if  $\varphi_1$  is significant and  $\varphi_2$  is not, then analysts' forecasts have explanatory power, suggesting that analysts' forecasts approximate market participants' expectations of current year's earnings. If  $\varphi_1$  and  $\varphi_2$  are significant, change in EPS has incremental explanatory power over analysts' forecast errors and analysts' forecast errors have incremental explanatory power over change in EPS.

**TABLE 3: Pooled Cross-Sectional Regressions of Mean-Adjusted Returns on Change in Earnings Per Share and Analysts' Forecast Errors Partitioned by Countries**

Country	Estimated Coefficients (t-values)		Adj. R <sup>2</sup>	F-value
	CEPS	AFE		
<b>U.S.</b> (n=19,445)	0.233 (12.6)*		0.0103*	202.7*
		0.598 (10.6)*	0.0076*	149.6*
	0.219 (11.8)*	0.548 (9.70)*	0.0166*	165.1*
<b>Australia</b> (n=1,339)	0.157 (2.44)**		0.0051*	7.85*
		0.627 (3.74)*	0.0052*	8.03*
	0.118 (1.75)***	0.476 (1.83)***	0.0074*	6.01*

Excess Returns = One-month excess returns during the month of earnings release.

CEPS = Change in annual earnings per share between time  $\tau$  and  $\tau-1$  deflated by price.

AFE = Actual I/B/E/S annual earnings per share less I/B/E/S forecast annual EPS deflated by price.

\* \*\* \*\*\*significant at  $p < 0.01$ ,  $p < 0.05$ , and  $p < 0.10$  respectively.

Results of the regression of excess returns on AFE and CEPS are presented in Table 3. Both CEPS and AFE are significant in the two countries. This result suggests that analysts' forecasts, or other information available to investors, provide incremental explanatory power to earnings changes. This implies that market participants use a combination of prior year's earnings and analysts' forecasts to form earnings expectations in both countries. The results of this test are reflective of a relatively high degree of investor sophistication in both countries. Investors appear to incorporate a combination of earnings and other financial and non-financial information (including analysts' forecasts) into earnings expectations.

**TABLE 4: Test of Differences in Regression Coefficients Across Countries**

Model	t-stat.
Single variable models	
CEPS only	1.14
AFE only	0.16
Two variable model	
CEPS	1.45
AFE	0.27

CEPS=Change in annual earnings per share between time  $\tau$  and  $\tau-1$  deflated by price.

AFE =Actual I/B/E/S annual earnings per share less I/B/E/S forecast annual EPS deflated by price.

H3 examines if the two countries react differently to earnings releases and analysts' forecasts. This is evaluated by comparing the magnitude of the coefficients on CEPS and AFE between the two countries. In essence, this test examines the relative strength of the market reaction to earnings in the two countries. The results, presented in Table 4, do not provide evidence of difference in the strength of the market reaction to unexpected earnings across the two countries. In particular, the t-tests indicate that the coefficients on CEPS and AFE are not significantly different between Australia and the U.S. This suggests that the differences in accounting standards, culture, and economy are not significant enough to generate differences in the market's utilization of accounting and analyst's information. This result is likely attributed to the fact that both countries have fairly sophisticated accounting standards and that both countries have mature markets that process all available information.

In sum, the results of this study reveal a high degree of similarity in the market reaction to the release of earnings in the U.S. and Australia. Specifically, the results indicate that there is a market reaction to the release of earnings. Thus, accounting information is value relevant and the market reacts to earnings that do not conform to expectations. In addition, analysts' forecast errors provide incremental information in explaining returns. Specifically, investors appear to incorporate analysts' forecasts in earnings expectations. Finally, no significant differences in the magnitude of the market reaction to earnings were identified.

## 6.0 Summary And Conclusion

The purpose of this study is to examine the relatively short-term market reaction to unexpected earnings in Australia and the U.S. Differences in accounting standards, stock market characteristics and culture may cause differences in market responses to earnings releases. Thus, we first explore key similarities and differences between the accounting standards of the two countries. A series of hypotheses is developed to examine whether accounting differences, in conjunction with culture and market characteristics, lead to varying market reactions to earnings announcements and market participants' expectations of current year's earnings.

The results show that both the Australian and U.S. markets react to unexpected earnings defined by both the change in prior year earnings and analysts' forecast errors. This suggests that accounting information is value relevant to investors in both countries. We then document that analysts' forecast errors provide information that is incremental to the change in earnings. Specifically, we regress analysts' forecast errors and the change in earnings per share on excess returns. The coefficients on both variables are significant. Thus, market participants in both countries use accounting earnings and other information to form earnings expectations. Finally, we utilize t-tests to examine if the countries process the available information differently. The results from this analysis suggests that differences in accounting standards, culture, and the economy are not significant enough to produce differences in the market's utilization of accounting and analysts' information.

This paper contributes to prior literature in several ways. First, most international literature examines a long-term reaction to earnings announcements. This paper examines excess returns surrounding the month of the earnings release. In addition, we provide evidence on the market reaction to both the change in accounting earnings and to analyst's forecast errors. This research also documents that accounting earnings and analyst's forecast errors provide incremental information to each other. Thus, market participants in the two countries rely on both financial and non-financial information when forming expectations about companies in which to invest. Finally, we add to international literature by comparing the behavior of two sophisticated markets. Most prior research has documented that various international markets react differently to information. This research shows that this is not the case in Australia and the United States.



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## End Notes

<sup>1</sup> See, for example, Amir et al. (1993) and Barth and Clinch (1998).

<sup>2</sup> See, for example, Kubota (1980) for Japan; O'Hanlon, Poon and Yaansah (1992) for the U.K.; Emanuel (1984) for New Zealand; Abdelsalam and Satin (1988) for Saudi Arabia; Ballester and Livnat (1997) for Spain; Cheung and Sami (2000) for Hong Kong and Hodgson and Stevenson-Clarke (2000) for Australia..

<sup>3</sup> See, for example, Alford et al. (1993), Harris et al. (1994), Frost and Pownall (1994), Joos and Lang (1994), and Ali and Hwang (2000).

<sup>4</sup> In both countries, equity ownership between 20 and 50 percent usually implies that an entity is able to exert influence over the investee.

<sup>5</sup> In the U.S., SFAS 142 became effective for all purchased goodwill after July 2001. Under *SFAS 142*, goodwill has an indefinite useful life and thus is not amortized. Instead, goodwill is examined annually for impairment.

<sup>6</sup> A class of non-current assets must have a similar nature or function (*AASB 1041*).

<sup>7</sup> See, for example, Easton and Zmijewski (1989) and Collins and Kothari (1989).

<sup>8</sup> Only the monthly stock prices are available from GV. Thus, because announcement dates vary within months, the pre-earnings announcement and post-earnings announcement periods vary across firms.

<sup>9</sup> This method is used due to limited data on commercial databases. Specifically, only monthly price data is available. Thus, there is insufficient data to calculate betas for each firm. Therefore, all betas are assumed to equal one. Brown and Warner (1980) provide support for this method, concluding the test using risk adjusted returns are no more powerful than tests using returns that had not been adjusted for systematic risk in tests using monthly data.

<sup>10</sup> All t-statistics for pooled data have been adjusted for heteroskedasticity using the method suggested by White (1980).